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“Knowledge is such a treasure which cannot be stolen”

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Indian Standard

GLOSSARY OF PNEUMATIC AND HYDRAULIC
CONVEYING TERMS AND DEFINITIONS

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

GLOSSARY OF PNEUMATIC AND HYDRAULIC CONVEYING TERMS AND DEFINITIONS

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GLOSSARY OF PNEUMATIC AND HYDRAULIC CONVEYING TERMS AND DEFINITIONS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 30 November 1970, after the draft finalized by the Conveyors, Vertical Hoists and Bucket Elevators Sectional Committee had been approved by the Mechanical Engineering Division Council.

0.2 This standard has been prepared for the guidance of manufacturers and users of pneumatic and hydraulic conveying equipment to assist them in the correct interpretation of the common terms used in pneumatic and hydraulic conveying trade and usage. It is hoped that this standard will help in establishing a generally recognized usage and eliminate ambiguity and confusion arising out of individual interpretation of terms.

0.3 This standard contains three sections. Section 1 deals with the terms which are common both to pneumatic and hydraulic conveying, Section 2 deals with pneumatic conveying and Section 3 deals with hydraulic conveying.

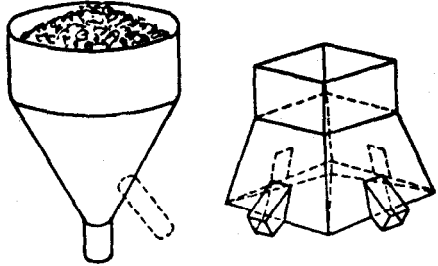
0.4 While preparing this standard considerable assistance has been derived from BS 3810:Part 3:1967 'Glossary of terms used in materials handling, Part 3 Terms used in connection with pneumatic and hydraulic handling' issued by the British Standards Institution.

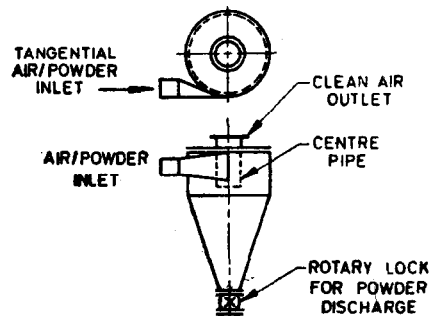
1. SCOPE

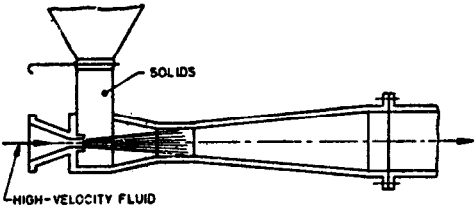
1.1 This standard gives the definition of terms commonly used in the pneumatic and hydraulic conveying trade, manufacture, installation and usage.

2. TERMINOLOGY

Section I Terms Common Both to Pneumatic and Hydraulic Conveying

REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
101	Bunker	A large bin or compartment for the storage of bulk materials.	
102	Conveying Line	The pipes or ducts along which the entrained solids are carried.	
103	Conveying Medium	A fluid which supports and conveys the solid material.	
104	Critical Settlement Velocity	The velocity below which the largest particles will settle out of the conveying medium.	

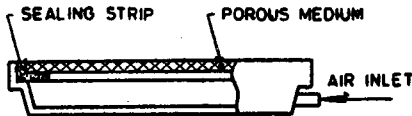
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
105	Cyclone	A device imparting a rotary motion to the fluid stream thereby causing the entrained particles to be separated by centrifugal force and gravity.	 <p>The diagram illustrates a cyclone separator. It features a cylindrical upper section and a conical lower section. A 'TANGENTIAL AIR/POWDER INLET' is shown on the side of the upper section, with an arrow indicating the flow direction. A 'CLEAN AIR OUTLET' is located at the top of the cylindrical section. A 'CENTRE PIPE' runs vertically through the center of the device. At the bottom of the conical section, there is a 'ROTARY LOCK FOR POWDER DISCHARGE'.</p>
106	Filter	A device used to remove entrained solids or other contaminants from fluids.	
107	Fluid	Any gas or liquid.	
108	Hopper	A box having a funnel-shaped bottom or a bottom reduced in size, narrowed or necked to receive material and direct it to a conveyor, feeder or chute.	

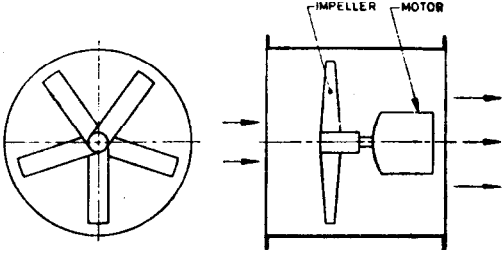
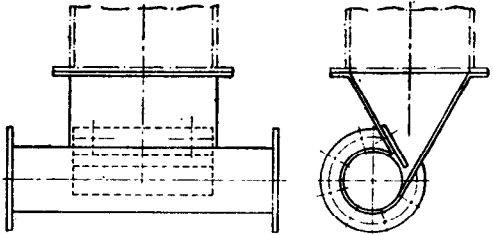
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
109	Injector	A device used to create a flow of fluid under suction through a pipe line. This device is also used to entrain solids into a high-velocity stream.	
110	Optimum Velocity	The velocity giving the lowest specific power consumption without settlement.	
111	Particle Exit Velocity	The velocity of solid particles at the delivery end of the transport line.	
112	Particle Velocity	The velocity of a solid particle at any given instant in the conveying direction.	
113	Pressure Relief Valve	A valve which automatically operates to relieve pressure.	

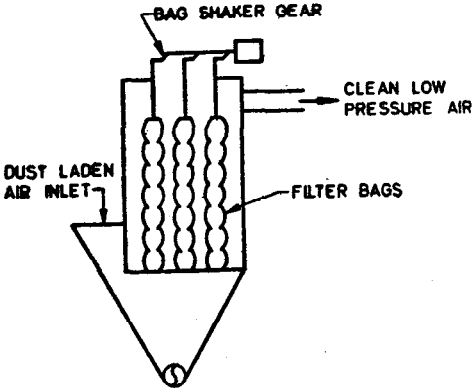
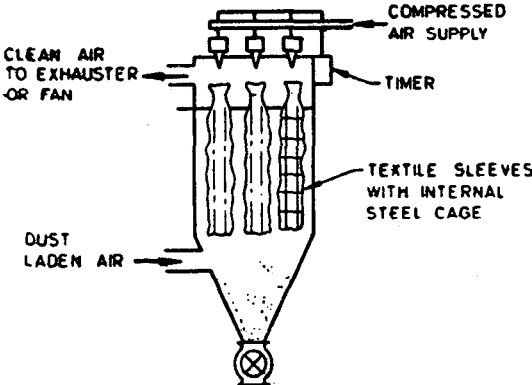
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
114	Screen	Any device, having perforations used for separating or grading wet or dry materials.	
115	Silo	A structure, usually round, for storage of material. A tall bunker or container for storage of loose material.	
116	Transport Line	<i>See 'Conveying Line'.</i>	
117	Turbulent Flow	A condition when the flow at any point does not remain constant either in magnitude or direction.	
118	Vacuum Relief Valve	A valve which allows fluid to enter the pipeline or appliance when the vacuum conditions occur.	

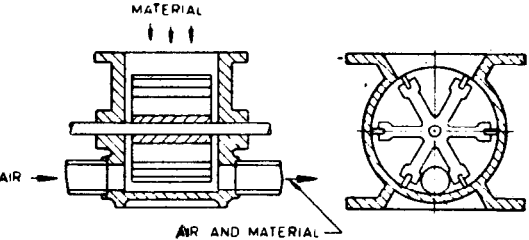
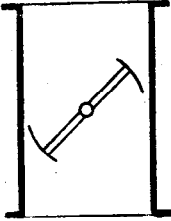
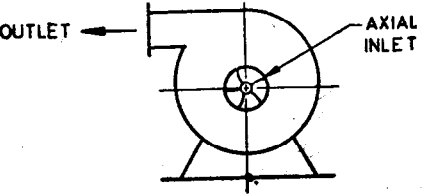
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
119	Valve	<p>Any device which controls the flow of fluid. Types of valve used in pneumatic and/or hydraulic conveying are as follows:</p> <ul style="list-style-type: none"> a) Sluice valve b) Shovel or flap valve c) Non-return valve d) Diaphragm valve e) Plug valve f) Gate valve g) Ball valve h) Disc valve 	

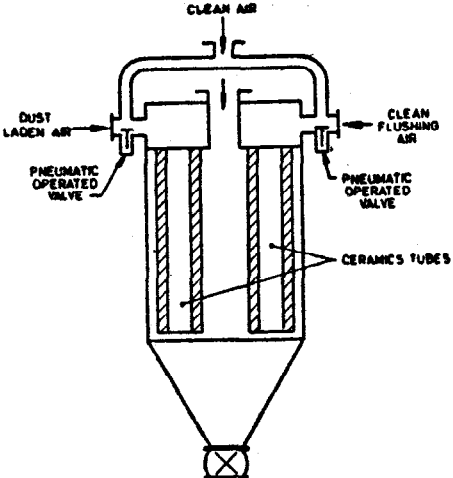
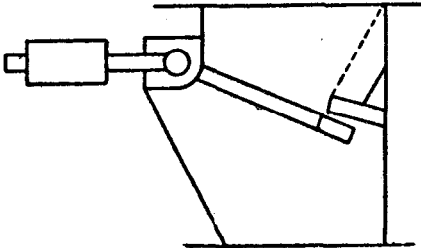
Section 2 Pneumatic Conveying

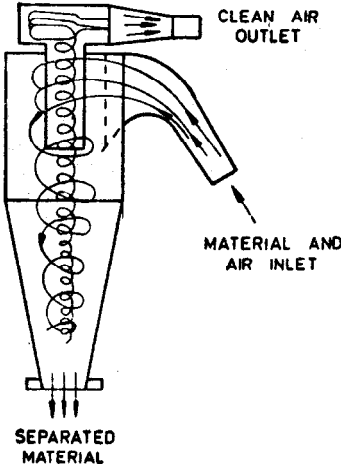
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
201	Aeration Unit	A porous surface through which gas is blown to assist the flow of materials from a hopper by local fluidization.	 <p>The diagram illustrates a cross-section of an aeration unit. It features a horizontal channel. At the top left, a 'SEALING STRIP' is shown as a cross-hatched layer. Below it is a 'POROUS MEDIUM', represented by a stippled pattern. At the right end of the channel, there is an 'AIR INLET' with an arrow pointing into the unit.</p>

REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
202	Angle of Repose	The angle formed by the horizontal with the side of the conical pile formed by the material when it falls freely and evenly from a small height.	
203	Axial Fan	One or more multi-bladed impellers rotating in a pipe or duct, normally direct coupled and capable of pumping axially large quantities of air at very low pressures.	
204	Back Entry Nozzle with Variable Outlet (for Pipeline)	A hopper-shaped unit forming an integral part of the conveying line and having a variable outlet.	

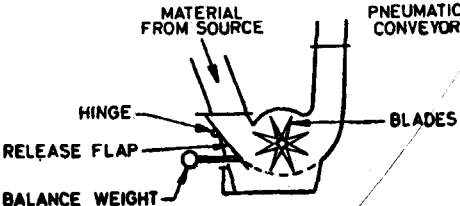
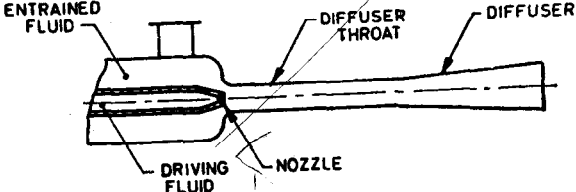
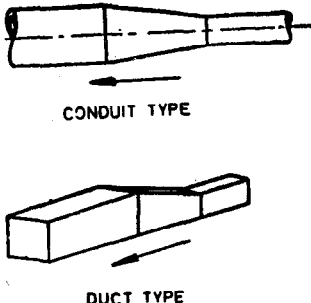
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
205	Bag Filter with Automatic Cleaning	A dust filter consisting of a chamber containing textile sleeves or glass wool fibre sleeves usually mounted over an expansion hopper. The sleeves are cleaned periodically by reverse flow of clean gas and/or shaking the sleeves vigorously.	
206	Bag Filter with Reverse Jet Cleaning	A filter similar to one defined in 205, but cleaned with a high pressure gas jet, without shaking of sleeves.	

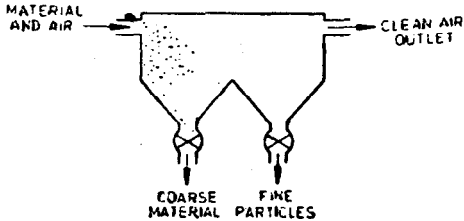
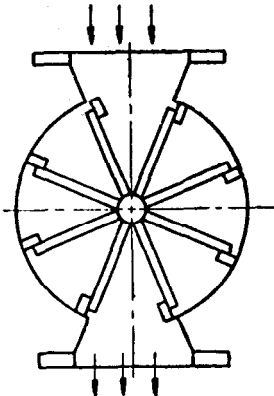
REF NO.	TERM	DEFINITION	TYPICAL EXAMPLE
207	Blowing Seal Feeder	Similar to feeder, rotary seal, defined in 219, but arranged to discharge into the conveying pipe when the rotor pocket is in the lowest position.	
208	Butterfly Valve	A valve with a disc rotating in axial bearings. The valve may have resilient seating in body or disc and resilient lining in body, or have metal seatings.	
209	Centrifugal Fan	A multi-bladed impeller rotating in a shaped housing, arranged to pump air or gas at relatively low pressures.	

REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
210	Ceramic Tube Filter	A filter similar to one defined in 205, but in which the sleeves are ceramic tubes. Alternatively, the sleeves may be porous plastic tubes.	
211	Counter- Weighted Flap Valve	A valve to control the out-flow of collected material and prevent the in-flow of atmospheric air or gas.	

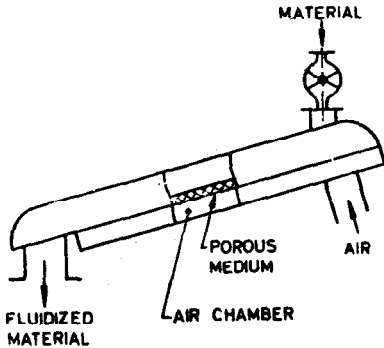
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
212	Critical Air Velocity	The air velocity below which fluidization cannot occur.	
213	Cyclone Separator	A cyclone designed to give continuous separation of material from conveying air.	 <p>The diagram illustrates a cyclone separator, a conical vessel used for separating particulate matter from a gas stream. It features a central vertical axis with a spiral path indicated by a dashed line and arrows. At the top, a horizontal inlet pipe labeled 'MATERIAL AND AIR INLET' enters the vessel. Near the top, a horizontal outlet pipe labeled 'CLEAN AIR OUTLET' exits the vessel. At the bottom, a vertical outlet pipe labeled 'SEPARATED MATERIAL' exits the vessel. The spiral path shows the material being separated from the air and falling towards the bottom, while the clean air exits from the top.</p>

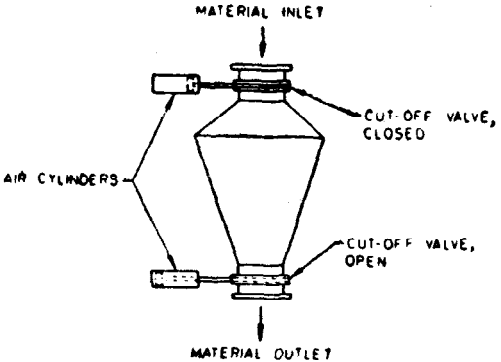
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
214	Cyclone Tail Valve	A device installed in the tail leg of a cyclone which allows the solids which have been separated to leave the cyclone, but which does not allow the entraining fluid to escape, or atmospheric air to enter.	
215	Dense Phase	The condition of fluidization in which the solid particles appear to boil like a liquid and no solids leave the fluidized bed.	
216	Dilute Phase	The condition of fluidization obtained with a bed of different particle sizes where some of the particles become entrained into the atmosphere above the bed.	

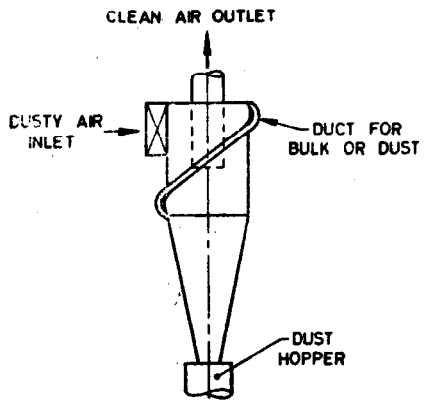
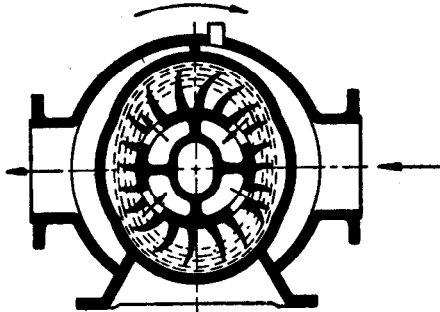
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
217	Diffuser:		
	a) <i>Diffuser (Flour Mill Type)</i>	A cylindrical casing in which vanes rotate to assist flour mill stock to change direction in a pipeline.	
	b) <i>Diffuser (Injector Type)</i>	That portion of an injector immediately following the high-pressure nozzle, normally having a parallel throat which then tapers to a larger diameter discharging into the conveying line.	
	c) <i>Diffuser (Duct or Conduit Type)</i>	That portion of a duct or conduit which uses, change of area to create change of characteristics of fluid flow.	

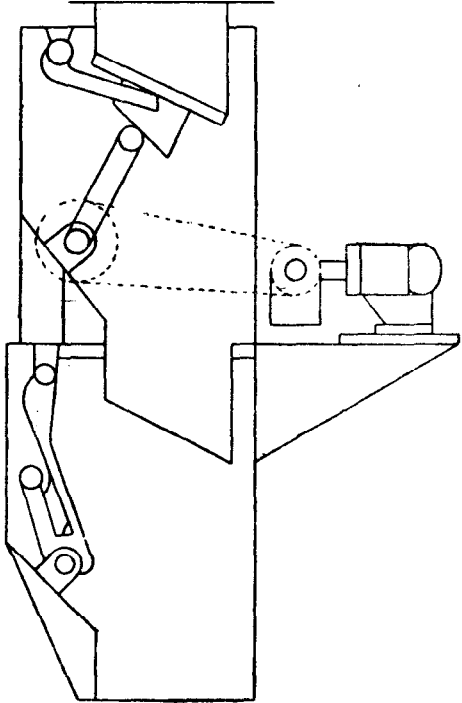
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
218	Expansion Box Separator	A simple separator used for separating large to small particles from an air stream by sudden expansion into the chamber. Several grade sizes may be obtained.	
219	Feeder Rotary Seal	A multi-bladed rotor, rotating in a casing delivering material continuously to or from a system without allowing gas or air to leave.	

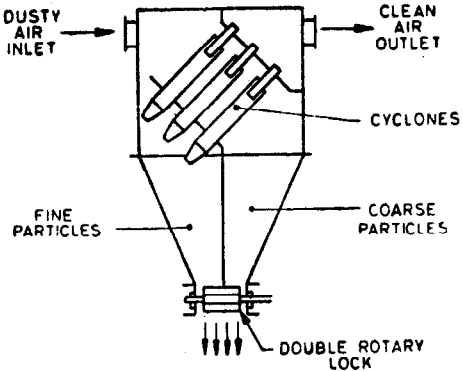
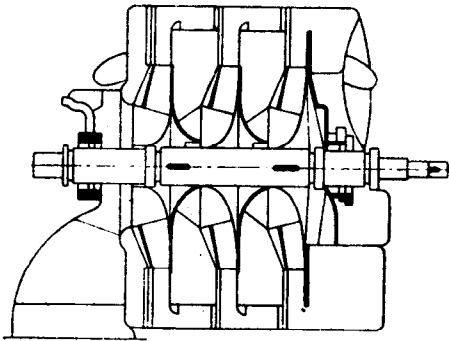
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
220	Fluidization	The physical treatment of solid particles so that they behave in certain respects like a fluid.	
221	Fluidized Bed	The space occupied by solid particles when they are in the fluidized condition.	
222	Fluidized Powder Pump (Pneumatic Pump or Blow Tank)	A pressure vessel having a valve controlling the inlet of material with interlocked admission of air, to fluidize and blow the mixture into the conveying line.	
223	Fluidizing Gas Velocity	The average velocity of the fluidizing gas through the fluidized bed.	

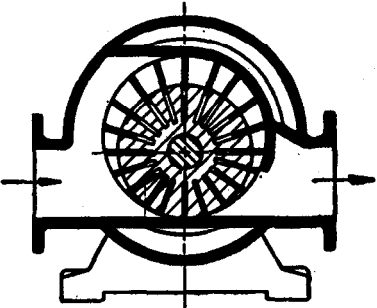
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
224	Fluidizing Conveyor	A tubular or rectangular duct divided horizontally by a porous medium. Material introduced into the upper section is fluidized by the air or gas passing through the porous medium and flows down the inclined duct like a fluid.	 <p>The diagram illustrates a fluidizing conveyor system. It consists of an inclined duct. Inside the duct, there is a horizontal porous medium. Material is introduced into the upper section of the duct. Air is introduced into an air chamber located below the porous medium. The material flows down the inclined duct, fluidized by the air passing through the porous medium. The output is labeled as fluidized material.</p>
225	Fluidizing Medium	The gas or liquid by which the solid particles are fluidized.	
226	Fluidizing Pad	See 'Aeration Unit'.	
227	Fluidizing Unit	See 'Aeration Unit'.	

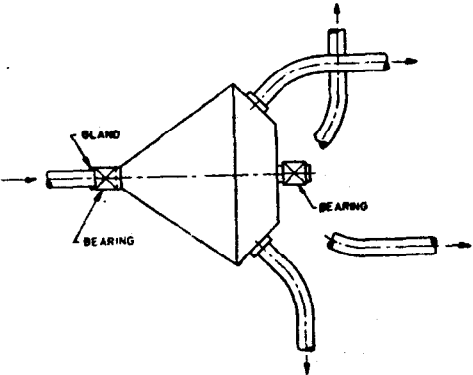
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
228	Free Air	The volume of air at prevailing atmospheric conditions entering any system.	
229	Gate Lock Hopper	A device giving intermittent discharge to material collected in a cyclone, or a pressure feed hopper.	 <p>The diagram illustrates a Gate Lock Hopper, a device used for intermittent discharge of material. It consists of a central hopper body with a conical bottom. At the top, there is a 'MATERIAL INLET' with a downward arrow. At the bottom, there is a 'MATERIAL OUTLET' with a downward arrow. Two 'AIR CYLINDERS' are connected to the sides of the hopper. Each cylinder has a 'CUT-OFF VALVE'. The top valve is labeled 'CUT-OFF VALVE, CLOSED' and the bottom valve is labeled 'CUT-OFF VALVE, OPEN'.</p>

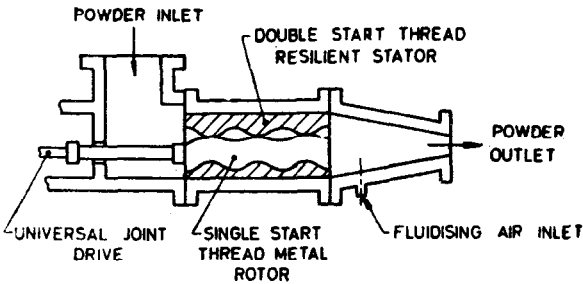
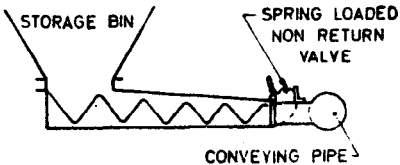
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
230	High Efficiency Cyclone	A cyclone capable of more effective separation of material, either by fitting a spiral duct which allows a proportion of the larger particles to flow at once to the exit cone, or by using a deeper central exit pipe. The pressure drop is higher than that for a normal cyclone.	 <p>The diagram shows a vertical cyclone separator. At the top, a central pipe is labeled 'CLEAN AIR OUTLET' with an upward arrow. To the left, a horizontal inlet is labeled 'DUSTY AIR INLET' with an arrow pointing into a rectangular duct. This duct connects to a spiral duct that winds around the interior of the cyclone. An arrow points to this spiral duct with the label 'DUCT FOR BULK OR DUST'. The bottom of the cyclone is a conical section that tapers to a small cylindrical base labeled 'DUST HOPPER' with an arrow pointing to it.</p>
231	Liquid Ring Compressor	A multi-bladed rotor rotating in an elliptical housing, partially filled with liquid which forms a seal.	 <p>The diagram shows a cross-section of a liquid ring compressor. It features a central rotor with multiple curved blades. The rotor is housed within an elliptical (D-shaped) casing. The space between the rotor and the casing is partially filled with a liquid, represented by a shaded area. Arrows indicate the rotation of the rotor and the flow of gas into and out of the compressor through side ports.</p>

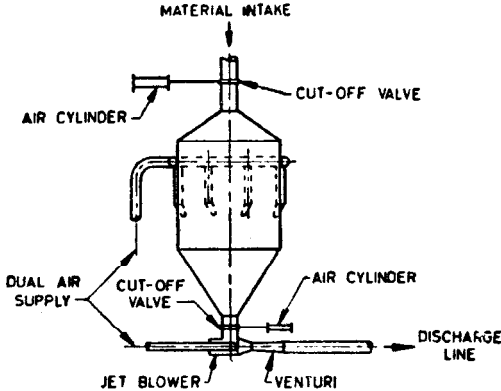
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
232	Liquid Ring Exhauster	<i>See</i> 'Liquid Ring Compressor'.	
233	Motorized Hopper Valve for Continuous Operation	Upper and lower valves with alternating operation, giving almost continuous discharge of material without reverse flow of fluid.	

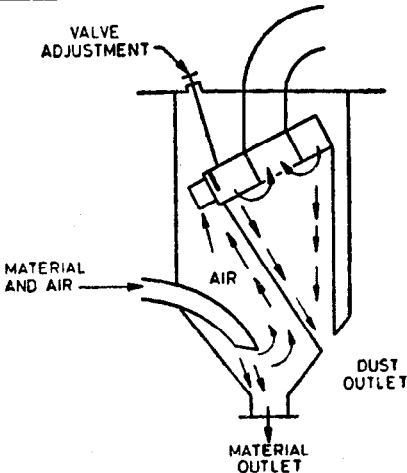
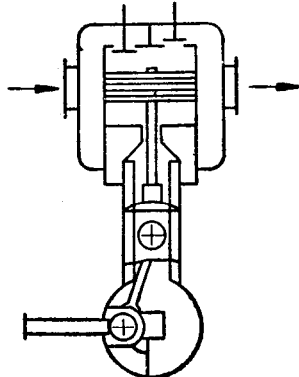
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
234	Multi-Cyclone Collector	A number of small cyclones mounted with their inlets in a chamber, wherein primary separation of particles takes place, gives high efficiency separation of small diameter particles.	
235	Multi-Stage Blower	A combination of rotors and stators designed to produce pressure differentials requiring a vacuum from 50 to 500 mm of mercury, depending upon the number of stages. Delivery of air is free from pulsation.	

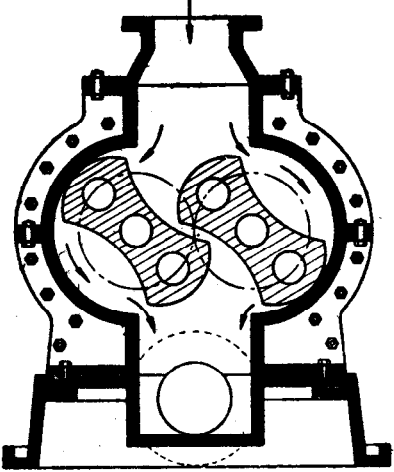
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
236	Multi-Stage Turbo-Exhauster	See 'Multi-Stage Blower'.	
237	Multi-Vane Rotary Compressor	A rotary pump having sliding vanes in the rotor and designed for pressure differentials of 150 to 700 mm of mercury.	
238	Multi-Vane Rotary Vacuum Pump	See 'Multi-Vane Rotary Vacuum Compressor'.	

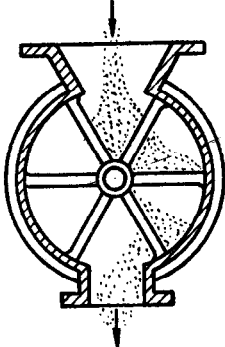
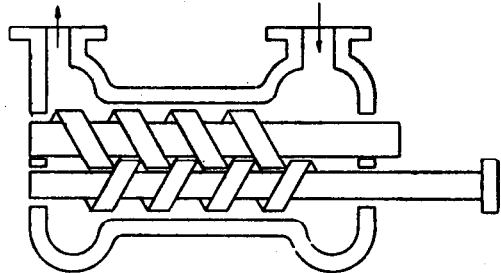
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
239	Multi-Way Valve	A rotatable chamber having a central inlet, and one outlet which can be positioned in line with any one of several radially spaced conveying lines.	 <p>The diagram illustrates a multi-way valve. It features a central horizontal inlet pipe on the left, labeled 'BLAND' at its tip. This pipe enters a rotatable, conical chamber. The chamber is supported by two bearings, each labeled 'BEARING'. On the right side of the chamber, there are three curved outlet pipes. One pipe is positioned vertically upwards, another is angled upwards and to the right, and the third is angled downwards and to the right. Arrows indicate the flow of material from the inlet into the chamber and then out through the selected outlet pipe.</p>
240	Pneumatic	Appertaining to air but in practice to any gas.	
241	Pneumatic Conveying	The movement of particulate solids in pipelines, ducts and silos by the application of gas, usually air.	
242	Pneumatic Handling	See 'Pneumatic Conveying'.	

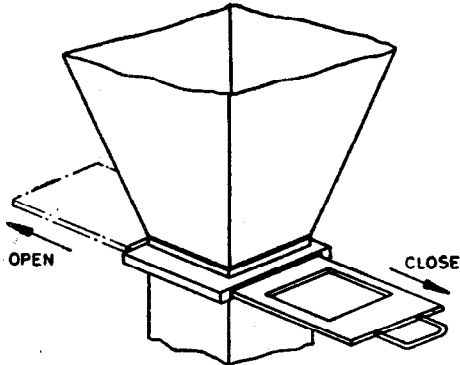
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
243	Positive Displacement Feeder	A feeder used on pressure differential systems. It forcibly introduces material into the conveying pipelines.	
244	Pressure Screw Feeder	A feeder used for introducing material into systems working above atmospheric pressure. The material is compacted, forming a seal against line pressure.	

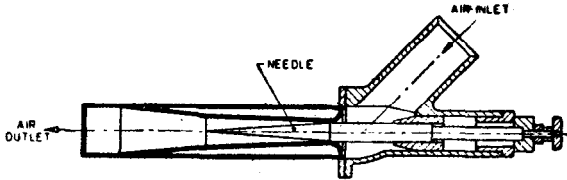
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
245	Pressure Vessel Feeder (Air Lock Hopper)	A pressure vessel with valves controlling the inlet and outlet of material with interlocked admission of high pressure air to blow the material into the conveying line.	

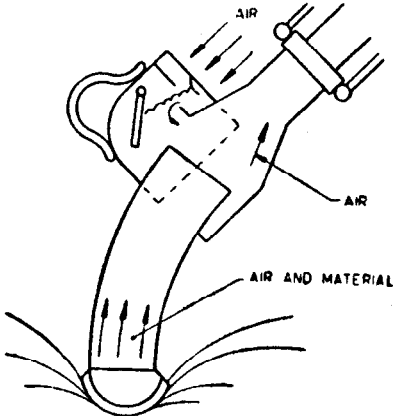
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
246	Receiver with Internal Cyclone	A large vertical cylinder with a hoppers bottom. The material-laden air enters the cylinder at a point near the base and its sudden expansion causes the coarser material to fall into the hopper. The dust-laden air is then drawn through the internal cyclone.	 <p>The diagram shows a vertical cylindrical receiver with a hopper bottom. An inlet at the base is labeled 'MATERIAL AND AIR'. Inside, a cyclone is formed by a conical structure. Arrows indicate 'AIR' moving upwards and 'MATERIAL' falling into the hopper. A 'VALVE ADJUSTMENT' is shown at the top. The top of the cylinder has a 'DUST OUTLET' and the bottom of the hopper has a 'MATERIAL OUTLET'.</p>
247	Reciprocating Vacuum Pump	A slow speed pump of large cylinder diameter relative to the stroke, used for large vacuum handling plants and capable of operating at a vacuum of up to 375 mm of mercury.	 <p>The diagram shows a cross-section of a reciprocating vacuum pump. It features a large horizontal cylinder with a piston and a vertical connecting rod. The piston is connected to a crankshaft. Arrows indicate the flow of air into and out of the cylinder.</p>

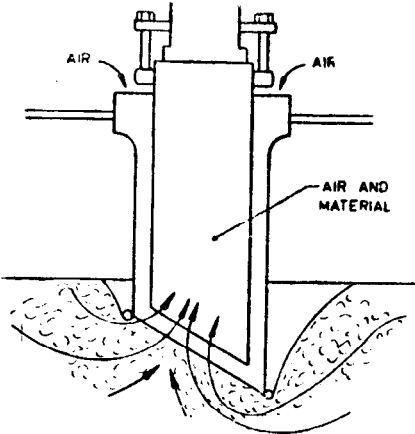
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
248	Roots Type Compressor	A positive displacement pump having synchronized lobed rotors in a housing, creating either a partial vacuum at the inlet, a pressure at the outlet, or both.	
249	Roots Type Exhauster	See 'Roots Type Compressor'.	
250	Roots Type Pump	See 'Roots Type Compressor'.	

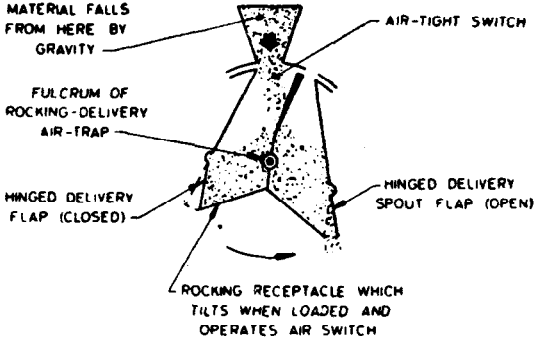
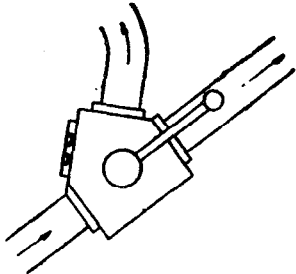
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
251	Rotary Air Lock	See 'Feeder Rotary Seal'.	
252	Rotary Vane Feeder	A rotor with three or more vanes rotating in a housing, allowing materials in hoppers to be discharged at a controlled rate (not suitable for use as a gas seal).	 <p>A cross-sectional diagram of a rotary vane feeder. It shows a circular rotor with six radial vanes mounted on a central shaft. The rotor is housed within a circular casing. Arrows indicate material entering from the top and exiting from the bottom through a controlled gap between the vanes and the housing.</p>
253	Screw Type Compressor	A rotary compressor having left hand and right hand worms in close engagement, which entrain the air or gas and eject it at higher pressure.	 <p>A cross-sectional diagram of a screw type compressor. It shows two intermeshing screws, one left-hand and one right-hand, rotating within a housing. Arrows indicate gas entering from the top and being compressed and ejected from the bottom. The screws are shown in close engagement to trap and compress the gas.</p>

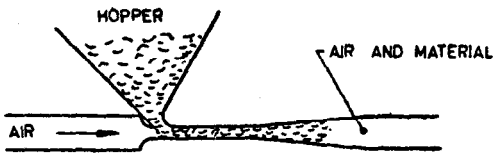
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
254	Shutter Valve (Plate Damper)	A sliding plate moving across a pipeline or hopper discharge outlet to control the flow of material.	
255	Sleeve Filter with Automatic Cleaning	<i>See 'Bag Filter with Automatic Cleaning'.</i>	
256	Sleeve Filter with Reverse Jet Cleaning	<i>See 'Bag Filter with Reverse Jet Cleaning'.</i>	

REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
257	Slid Valve	<i>See 'Shutter Valve'.</i>	
258	Solids Pump	<i>See 'Positive Displacement Feeder'.</i>	
259	Sonic Valve	A nozzle containing an adjustable needle, which induces air flow at sonic velocity in order to pass constant air quantity against fluctuating back pressure.	
260	Star Valve	<i>See 'Rotary Vane Feeder'.</i>	

REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
261	Suction Nozzle:	A device to introduce material into a suction line.	
	a) <i>Camel-Back Nozzle</i>	A unit with hand-controlled valve for regulating the intake of air to ensure correct air-material mixture.	 <p>The diagram illustrates a hand-held nozzle, identified as a 'Camel-Back Nozzle'. It features a curved, ergonomic handle with a hand-controlled valve. At the top of the handle, there are two ports labeled 'AIR' with arrows indicating air intake. The nozzle is shown in a position where it is drawing material from a source at the bottom, indicated by a dashed line and arrows labeled 'AIR AND MATERIAL'. The nozzle is depicted with a flexible, hose-like section at the top, and the overall design suggests it is used for mixing air with a material being suctioned.</p>

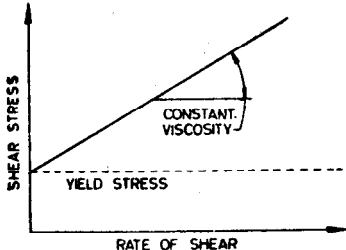
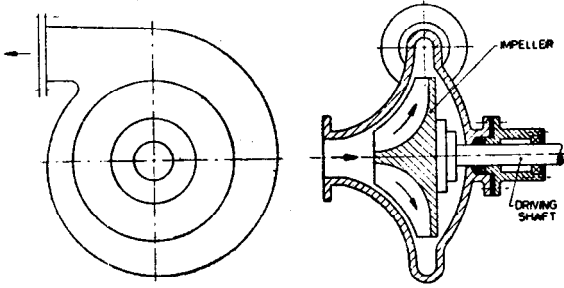
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
	b) <i>Sleeve Nozzle</i>	A unit with an adjustable outer sleeve for regulating the intake of air to ensure correct air-material mixture.	

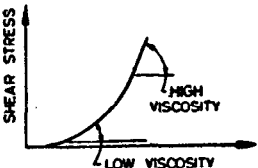
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
262	Tipper Seal	A reciprocating device for discharging material from a receiver or hopper without breaking down the vacuum.	 <p>MATERIAL FALLS FROM HERE BY GRAVITY</p> <p>FULCRUM OF ROCKING-DELIVERY AIR-TRAP</p> <p>HINGED DELIVERY FLAP (CLOSED)</p> <p>HINGED DELIVERY SPOUT FLAP (OPEN)</p> <p>AIR-TIGHT SWITCH</p> <p>ROCKING RECEPTACLE WHICH TILTS WHEN LOADED AND OPERATES AIR SWITCH</p>
263	Two-Way Valve	A means of diverting a single conveying stream of material to two alternative receiving points.	

REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
264	Venturi Feeder	A low-efficiency feeder for introducing materials into conveying pipelines, whereby the materials enter at the throat of a venturi section placed in the pipe-line.	 <p>The diagram shows a hopper at the top left, with material falling into a horizontal pipe. An arrow labeled 'AIR' points into the pipe from the left. The material and air mix in the pipe, and an arrow labeled 'AIR AND MATERIAL' points to the mixture flowing to the right.</p>
265	Worm Type Compressors	See 'Screw Type Compressor'.	

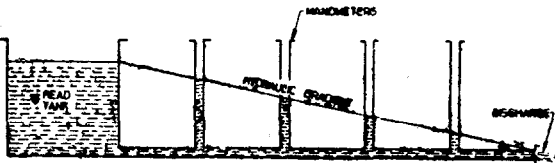
Section 3 Hydraulic Conveying

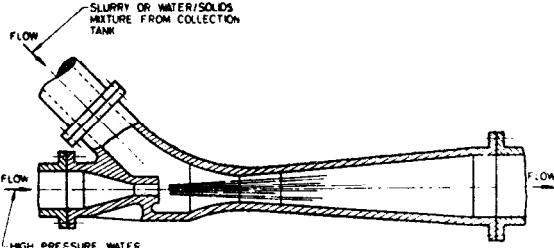
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
301	Agitator Pump	A pump of any type, used to keep solids in suspension by turbulence.	
302	Air Relief Valve	A valve, installed at the highest point in a pipeline or appliance, which allows air to be removed.	

REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
303	Bingham Plastic Fluid	A fluid in which, when pumped in a pipeline, the centre part of the fluids travel as a core or plug, while the section between the cone and the walls behaves as a Newtonain fluid (<i>see</i> 324).	
304	Centrifugal Pump	A pump consisting of a casing which contains a multi-bladed impeller, revolving continuously at high speed.	

REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
305	Clarified Liquid	A conveying medium which has been utilized to convey solids and then has afterwards been cleaned for reuse.	
306	Classifier	A mechanical or hydraulic device which can be arranged to separate solids of different sizes, or materials of different specific gravities.	
307	Density Meter	A device which measures and indicates the density of the mixture.	
308	Dilatant Fluid	A fluid in which the viscosity increases with increasing shearing rate.	

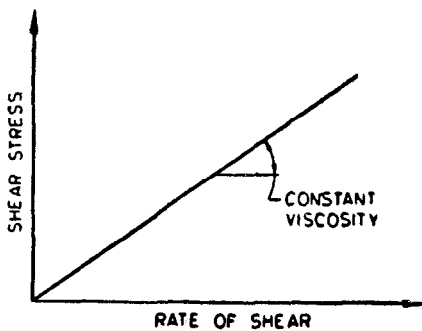
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
309	Ejector	A device in which high velocity jets of liquid, usually arranged circumferentially are used to create a vacuum in order to draw a mixture of air and fine particles along a pipe, mixing them with the liquid and conveying them as a slurry.	
310	Flow Meter	A device which measures the amount of fluid flowing in a pipeline.	
311	Frost Line	The depth to which frost will penetrate the ground (pipes must be buried below this level to be unaffected by frost).	
312	High Pressure Sluiceway	A sluiceway, substantially horizontal, in which water under high pressure conveys the material.	

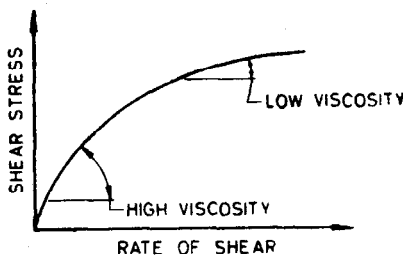
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
313	Hydraulic	Appertaining to water but in practice to any liquid.	
314	Hydraulic Conveying	The movement of materials along a pipeline sluiceway, launder or channel, using a liquid as the conveying medium.	
315	Hydraulic Conveyor	A conveyor, usually handling ashes or mill scale, consisting of a trough or tube in which high pressure water jets force the material along at high velocity to discharge into a pit for settling out or further pumping.	
316	Hydraulic Gradient	A line, the height of which above a base-line represents the pressure head at any point along a pipeline.	

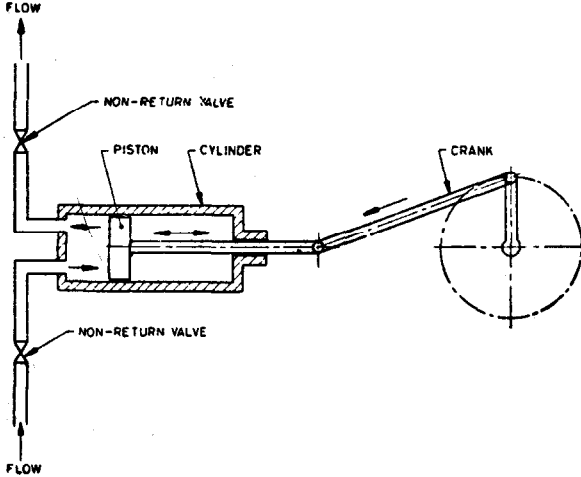
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
317	Jet Pump	A device in which a central high velocity jet of liquid is used on the venturi principle to pump another liquid or slurry to a higher pressure.	
318	Lagoon	A lake into which slurry is pumped, the solid particles settling out and allowing the liquid content to drain away or to be drawn off.	

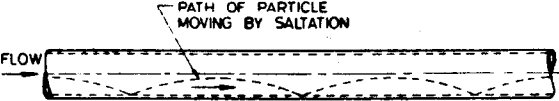
REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
319	Laminar Flow (Stream-line Flow)	A condition when successive layers of liquid slide over one another without intermixing. This is the condition in a pipe when generally the velocity of the mixture or liquid is very slow and the cross-section of the fluid may be considered to consist of a large number of annular rings; each ring travelling at a different velocity to its adjacent rings; the highest velocity being in the centre and the lowest velocity at the pipe walls.	
320	Line Velocity	The average velocity of mixture or slurry in a pipeline.	

REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
321	Lock Hopper System of Feeding Pipeline	A device into which solid particles are allowed to flow until the vessel is full. The flow is then shut off and the pressure in the vessel is increased until it is above that of the conveying pipeline. This rise in pressure causes a door at the bottom of the vessel to open and the contents are forced into the pipeline.	<p>The diagram illustrates a lock hopper system. At the top, a cylindrical hopper receives 'MATERIAL FEED INTO HOPPER'. It features an overflow pipe on the left labeled 'TO OVER FLOW' and a 'MAKE-UP PIPE' on the right. The hopper tapers into a larger 'LOCK HOPPER' chamber. A 'VALVE OR GATE' is located at the top of this chamber. A side pipe on the right of the lock chamber is labeled 'HIGH PRESSURE WATER' and has a 'VALVE'. At the bottom of the lock chamber, another 'VALVE OR GATE' is shown. An arrow at the bottom left indicates the 'DIRECTION OF FLOW' into a horizontal 'PIPE LINE'.</p>

REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
322	Mixing Channel	A channel into which materials are introduced from different sources and mixed by turbulence caused by low pressure air or liquid jets.	
323	Mixture	Can be a mixture of solids in the dry state or a mixture of liquids, but generally considered in hydraulic conveying to be a mixture of solids and liquid.	
324	Newtonian Fluid	A fluid in which the viscosity does not change with shearing rate. These fluids include water, oil and gas and have a constant viscosity at constant temperature.	

REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
325	Purging Pump	A pump, of any type, which is used to wash the conveying medium out of the system.	
326	Pseudo- Plastic Fluid	A fluid in which the viscosity decreases with increasing shearing rate.	 <p>The graph shows Shear Stress on the vertical axis and Rate of Shear on the horizontal axis. A concave-down curve starts at the origin and levels off as the rate of shear increases. Two points on the curve are marked with tangent lines to the horizontal axis. The lower rate of shear point is labeled 'HIGH VISCOSITY' and the higher rate of shear point is labeled 'LOW VISCOSITY', illustrating that viscosity decreases as the shearing rate increases.</p>

REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
327	Reciprocating Pump	A positive displacement pump in which one or more pistons travel in a cylinder or cylinders, drawing in and discharging a fixed quantity of fluid on each stroke, the inlet and outlet conditions being controlled by valves.	 <p>The diagram illustrates a single-acting reciprocating pump. A horizontal cylinder contains a piston. The piston is connected to a crankshaft (labeled 'CRANK') via a connecting rod. The crankshaft is shown in a circular cross-section with a vertical centerline. Two vertical pipes are connected to the cylinder: one on the left (inlet) and one on the right (outlet). Each pipe is equipped with a 'NON-RETURN VALVE'. Arrows indicate the flow direction: fluid is drawn into the cylinder from the inlet pipe during the suction stroke and discharged into the outlet pipe during the discharge stroke. The piston's movement is indicated by arrows pointing left and right within the cylinder.</p>
328	Recirculating Pump	A pump, of any type, used to recirculate a fluid throughout all or part of a system.	

REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
329	Saltation	The process by which large material above the specific gravity of the conveying medium can be conveyed in a substantially horizontal pipeline by a series of jumps.	
330	Sealing Water	Clean water supplied at a slightly higher pressure than the working pressure in the line, used to keep a gland or seal free from foreign matter by allowing water to leak into the conveying pipeline.	
331	Sealing Water Pump	A pump, of any type, which supplies water to seals or glands at a pressure higher than the working pressure.	
332	Settlement Time	The time taken for solid particles to settle out of suspension after turbulence has ceased.	

REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
333	Sluiceway	An open trough, flume or channel in which material is conveyed by fluid flowing under gravity.	
334	Slurry	A mixture of fine solids and liquid, the solids being in suspension and having the general flow properties of a liquid or a plastic.	
335	Solids Pump	A type of centrifugal pump in which the spacing of the vanes and clearances between impeller and casing allow the solids in the mixture to pass through the pump.	
336	Submerged Specific Gravity of the Material Conveyed	This is generally taken to be the apparent specific gravity of the mixture.	

REF No.	TERM	DEFINITION	TYPICAL EXAMPLE
337	Swirl Tank	A vessel, usually conical in shape, in which the mixture is introduced from different sources and mixed by self-induced turbulence.	
338	Thickener	Equipment arranged to increase the concentration of solids to liquid, either by precipitation, gravitation or suction.	
339	Tundish	A collection vessel, usually conical, for the reception of liquid from one or more sources.	
340	Turbine Pump	A multi-stage centrifugal pump in a single casing, generally used for high pressures.	
341	Vortex Mixer	A vessel, usually conical in shape, into which material and the conveying liquid are introduced. Mixing is induced through turbulence caused by higher pressure jets or other means.	

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	Unit	Symbol	Definition
Force	newton	N	1 N = 1 kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

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